

**REDUCED SIZE, LOW LOSS MEMS TORSIONAL HINGES AND MEMS
RESONATORS EMPLOYING SUCH HINGES**

ABSTRACT OF THE DISCLOSURE

5 Torsional hinge support beams (104, 106, 108, 110, 400, 500, 600, 700,
800, 900, 1000, 1100, 1200, 1300, 1400, 1500) that are corrugated, perforated
and/or have non-uniform width are provided. The support beams are useful in
flexural beam resonators (100, 1600), in which they serve to support the main
flexural mode-vibrating beam (102, 1602). The support beams have phase
10 lengths equal to an odd multiple of $\pi/2$, preferably the phase lengths are about
equal to $\pi/2$ at the operating frequency of the resonators. Owing to the
corrugations, the lengths of the support beams are shorter than comparable solid
straight edge support beams. The short lengths of the support beams reduce the
overall area occupied by the resonators and allow higher bias voltage to be
15 employed in order to obtain greater electromechanical coupling.